5.11 CEMENTIOUS MATERIAL

5.11.01 GENERAL

This section covers the sampling, inspection and acceptance of Portland Cement, lime, Fly Ash, Silica Fume, and Ground Granulated Blast Furnace Slag.

5.11.02 PORTLAND CEMENT

(a) General.

Portland Cement is manufactured by mills located in Kansas and in several adjoining states. Six different types of cement are manufactured, Type I, Type IP, Type I (PM), Type II, Type I/II and Type III. All these are covered by Kansas Department of Transportation Specifications. Type II cement is usually required for concrete pavement and bridge decks with Type I, Type IP, Type I (PM) or Type II being allowed for all other concrete uses. Type I/II meets the requirements of both Type I and Type II and may be used when either type is specified. Type III cement reaches high strength earlier than other types and is sometimes permitted for use with small structures when it is important to finish a job quickly.

Cement is produced by burning raw material and grinding the resultant clinker which consists essentially of hydraulic calcium silicates. Portland Cement may be delivered to the project in bags or in bulk. Most shipments to projects and to ready-mix plants are in bulk.

(b) Responsibility.

It is the responsibility of state inspection staff to assure that cement manufacturers, concrete producers, and contractors comply with the Standard Specifications, and Special Provisions. Complete and sincere cooperation of all persons involved is essential for successful and efficient cement inspection. The current list of prequalified cement plants is available from the Chief of Materials & Research, Docking State Office Building, Topeka, Kansas 66612.

(1) The operator of a prequalified cement plant or terminal furnishes all necessary information and facilities for adequate sampling by the State or the State's representative to maintain prequalified status.

a. The plant operator exercises good quality control of the products and submits a monthly report of the test results and a statistical analysis (including standard deviations and means) of all the plant's quality control tests for the month to the Chief of Materials and Research for all products for which the plant is prequalified.
b. A representative of the cement company must issue a certification to accompany each shipment consigned to State work. The certification shall show compliance with the specification and is to be attached to or made a part of the scale ticket, weigh bill or other shipping document accompanying the shipment.

(2) Terminals are described as storage facilities established by cement companies in urban or large market areas some distance from a cement plant. The terminal is considered approved to supply cement to Kansas Department of Transportation projects if the cement plant which produced it is prequalified. Cement shipped from terminals established by a prequalified cement company is to be

handled the same as if shipped direct from the cement plant. A certification indicating compliance with the specifications, signed by a representative of the cement company, must accompany each shipment.

(3) The Contractor, when purchasing cement from a prequalified cement plant advises the plant of the type of cement required and that a certification must accompany each shipment. The contractor must submit a copy of each certification to the Engineer. When purchasing concrete from a ready-mix operator, the contractor advises the operator of the need for certification of the cement by a representative of the cement company, and furnishes the ready-mix operator information relative to project number, type of cement and class concrete.

(4) The Ready-Mix Plant Operator, when furnishing concrete to State work requires certifications from the cement company for all cement delivered during the progress of work. In the case of cement in storage at the ready-mix plant at the beginning of a project which cannot be certified to the producing cement company, or which has been in storage for more than three months, the Field Engineer must be notified so that appropriate sampling and testing may be done prior to the beginning of the work. The Ready-Mix operator certifies each week (**DOT Form 697**) to the Field Engineer that all cement used to produce concrete for State work during that week was State approved, and lists certified cement received during the week.

(5) The Field Engineer determines if the project is to be constructed of job mix or ready-mix concrete and reminds the Contractor that cement company certifications or State tests are required for all cement in storage at the beginning of the work and that all shipments received during the progress of the work must be accompanied by certifications. The Field Engineer verifies that the plant furnishing the cement is prequalified for the type being furnished. The Field Engineer determines during the construction of the project that certifications are available for all cement being used. The cement is acceptable for immediate use provided each shipment is accompanied by a certification showing compliance with specifications. The Field Engineer is to review the certifications from the contractor or ready-mix plant operator and at the completion of the project issues an acceptance report covering all cement used on each State project. (Use CMS Screen 130, Sample I.D. or Miscellaneous Report Form DOT 623, separate report for each producer supplying cement to a project. The type reported must match the type prequalified.)

(6) Regional and District Laboratories perform sampling, record keeping and reporting necessary for monitoring compliance with specifications at cement plants and terminals in their area. Information Samples are obtained at the frequency of one per type prequalified every other month throughout the year. Offices sampling more than one plant should stagger their plants on opposing months to level out their sampling and MRC testing workloads. Samples of cement are to be obtained from one or more of the following sources.

a. Production Streams (only when agreed to by the producer)

b. Loading streams

c. Loaded containers

d. Transfer streams (from storage silo to shipping silo)

Verification samples are taken by each District at the rate of one sample per each one half calendar year from each mill or source providing cement in the District during that period.

Additional verification samples and tests may be required if any of the producer submitted data, or KDOT Verification or Information Sampling indicate a problem with quality control or compliance with Kansas specification limits. The increased sample frequency will be established in writing by the Chief of Materials and Research, and will remain in effect until the problem is resolved.

Test reports are issued to the Bureau of Materials and Research and to the appropriate cement plants on special request.

(c) Basis of Acceptance.

See Standard Specifications Manual Subsection 2001.

(d) Reporting.

Acceptance reports covering shipments of cement from unqualified plants are issued by the Materials and Research Center.

An acceptance report covering cement received from each qualified plant or approved terminal storage unit is issued by the Field Engineer. The report is issued after all concrete work is completed and covers the quantity of each brand and type of cement used on the project.

(e) Sample Forms and Reports.

The following report forms and suggested certification statements illustrate references in the preceding sections.

(1) Certification from the Prequalified Cement Plant or Terminal.

A certification similar to this suggested statement must accompany each shipment destined for State Projects. (See **Figure 5.11.1**)

(2) DOT Form 697 (697A) - Certification of Cement used by Ready-Mix Company.

a. One copy of this form is sent to the Field Engineer by the Ready-Mix producer for the cement received and/or used during each week. If cement is neither received nor used during a weekly period, this form need not be submitted. (See **Figure 5.11.2**)

b. A certification is supplied to the Field Engineer covering cement in storage at the beginning of a project. (See **Figure 5.11.3**)

(3) The following forms are used by the Field Engineer to report cement produced by prequalified companies and used on State Projects.

a. CMS Screen 130, Sample I.D. with assignment to the plant using CMS Screen 265. Follow procedures outlined in Materials Operations Memo 1007. (See **Figure 5.11.4**)

b. DOT Form 623 - Miscellaneous Report Form for those projects not on CMS. (See **Figure 5.11.5**)

SUGGESTED CERTIFICATION FROM A PREQUALIFIED
CEMENT PLANT OR TERMINAL

Date:_____

Truck or Car No._____

Shipped to:_____

_____

_____

This certifies that the Type _____ Portland Cement in this shipment was loaded from silo Number _____ , and that it complies with Kansas Department of Transportation specifications.

CEMENT COMPANY:_____

PLANT LOCATION:_____

TERMINAL (IF DIFFERENT):_____

SIGNED:_____

Figure 5.11.1
KANSAS DEPARTMENT OF TRANSPORTATION

CERTIFICATION OF MATERIALS USED BY READY MIX COMPANY

Project No.:_____

Date: _____

MEMORANDUM TO:_____,RESIDENT ENGINEER

Re: Certification of Cement

This is to certify that all of the cement used in the production of concrete for the above project during the week of

_____(Sunday) to _____(Sat., Include.) was Type_____ cement and

that the company from which this cement was received has certified that the cement meets the specifications of the Kansas Department of Transportation. Certifications covering this cement are on file in this office.

The following shipments of certified cement have been received by this company during the weekly period listed above:

BRAND	QUANTITY	DATE OF CERTIFICATION

Re: Certification of Aggregates

Type of Aggregate	Location of Deposit				Total Approx. Tons/Yds. This Week	
	Sec.	Twp.	Range	County	Received	Incorporated in Mix

This is to certify (Check applicable box or boxes)

1. All of the aggregates described above were:
   - ☐ (A) Produced at the deposit location described.
   - ☐ (B) Loaded from State tested and approved stockpile at the production site or from the plant while it was producing aggregate meeting applicable specifications.
2. ☐ Only State tested and approved aggregates were used to produce ready-mixed concrete delivered to State work.

_____
Name of Ready Mix Co

_____
(Signature) (Title)

Figure 5.11.2
KANSAS DEPARTMENT OF TRANSPORTATION

CERTIFICATION OF MATERIALS USED BY READY MIX COMPANY

Project No.:_____

Date: _____

MEMORANDUM TO:_____, RESIDENT ENGINEER

Re: Certification of Cement

This is to certify that all of the cement used in the production of concrete for the above project during the week of

_____(Sunday) to _____(Sat., Include.) was Type_____ cement and

that the company from which this cement was received has certified that the cement meets the specifications of the Kansas Department of Transportation. Certifications covering this cement are on file in this office.

Re: Certification of Aggregates

Type of Aggregate	Location of Deposit				Total Approx. Tons/Yds. This Week	
	Sec.	Twp.	Range	County	Received	Incorporated in Mix

This is to certify (Check applicable box or boxes)

1. All of the aggregates described above were:
   - ☐ (A) Produced at the deposit location described.
   - ☐ (B) Loaded from State tested and approved stockpile at the production site or from the plant while it was producing aggregate meeting applicable specifications.
2. ☐ Only State tested and approved aggregates were used to produce ready-mixed concrete delivered to State work.

_____
Name of Ready Mix Co

_____
(Signature) (Title)

Figure 5.11.3

DTMTBI30 MAINTAIN SAMPLE ID RECORD READ
MATERIAL

Sample Id: 10632

Inspector Id: R LOHRMEY Resp Loc: 33 Total Samples: 1
Type Insp: ACC Date Sampled: 01 28 94 Related Sample Id:
Type Test: 900 Free Form Text Proj Id: _ _
Contract #: Item Code: Line #: Quantity: 0.000
Producer: 00007701 Name: MNARCH CMENT, HUMBLDT Loc: HUMBOLDT St: KS
Legal Desc:
Mix Plant: CC071700 Name: ALLIED, INC.
Matl Cd: 161060100 CEMENT TY 1/2 BL/BAG Desc: Unit: TONS
Qty Represented: 100.450 Nbr of Items: 1 Qty assigned: 100.450
Sampled From: RAIL CAR Ledge: Lot/Heat Nbr:
Lab: FLD Name: FIELD (TEST/INSP)
Dates :: Shipped: Received:
Test Start: 01 28 94 Est Compl: 01 28 94 Act Compl: 02 02 94
Test Result: PASS Authorized By: HAROLD SHCLEICHER
Remarks: THE ABOVE MATERIAL WAS ACCEPTED ON THE BASIS OF VISUAL INSPECTION
AND CERTIFICATION ON FILE OF A MATERIAL FROM AN APPROVED SOURCE.

F1=HELP F3=EXIT F6=TST F9=CNCL

DTMTB265 MATERIALS ASSIGNMENT CREATE MATERIAL

Assign From: Producer: 00007701
Contract: 0 Item Code: Line # :
Matl Cd: 161060100 Name:
Description: Units: Inspector: H SHCLEIC

Assign To:

Contract	Producer Or Item Code	Line #	Qty	Number Items	Sample Id	Inspection Data	Assign Date
	CC071700		100.450		00010632	PLANT USE	07 18 94

Figure 5.11.4
KANSAS DEPARTMENT OF TRANSPORTATION

REPORT OF SAMPLE OF _____

Laboratory No. _____

_____19____

Received _____19____

Specification No. _____ Quantity Represented _____

Source of Material _____

Sample From _____

Submitted By _____

Identification Marks _____

Project or POV _____

Type of Construction _____

Contractor _____

TEST RESULTS

Reported By _____

Title _____

D.O.T. Form No. 623

Figure 5.11.5

KANSAS DEPARTMENT OF TRANSPORTATION

5.11.03 HYDRATED LIME AND QUICKLIME

(a) General.

Hydrated lime and quicklime are produced by heating a limestone that is very high in calcium carbonate and driving off carbon dioxide to produce calcium oxide. The resulting quicklime is then hydrated by adding water to produce the hydrated lime. Hydrated lime may also be made by slaking quicklime using special equipment and as a by-product of carbide gas production. These special cases are addressed in the specifications. Most of the lime used for the purpose of stabilization is produced in plants located at points outside the State of Kansas.

(b) Basis of Acceptance.

See Standard Specifications Manual Subsection 2002.

The Field Engineer obtains samples from shipping containers selected at random to verify the certifications issued by the producer. Should these samples indicate inadequate internal quality control by the producer, acceptance on certification is halted and each shipment is sampled and tested prior to use.

(c) Inspection and Sampling.

Lime shipped from plants having a satisfactory record of quality control is not inspected by a Department representative prior to its arrival at destination. Therefore, the Field Engineer is responsible for the identification of the shipment with the accompanying certification and the taking of verification samples from shipments selected at random. Samples are to be taken in accordance with the requirements of **subsection 5.16.29.**

(d) Reporting.

The Field Engineer issues reports for lime covered by producer's certifications.

5.11.04 SILICA FUME

(a) General.

Silica fume is a by-product resulting from the reduction of high-purity quartz with coal in electric arc furnaces in the manufacture of silicon and ferrosilicon alloys.

(b) Basis of acceptance.

See Special Provision 90P/M-158 (latest revision).

5.11.05 FLY ASH

(a) General.

Fly ash is a finely divided residue that results from the combustion of ground or powdered coal.

(b) Basis of Acceptance.

See Standard Specifications Manual Subsection 2004.

(c) Sampling.

Samples are to be taken in accordance with the requirements of **subsection 5.16.29.**

(d) Reporting.

The Field Engineer issues reports for fly ash covered by producer's certifications.

5.11.06.1 GROUND GRANULATED BLAST FURNACE SLAG.

(a) General.

The glassy granular material formed when molten blast-furnace slag is rapidly chilled as by immersion in water.

(b) Basis of acceptance.

See Special Provision 90P/M-237 (latest revision).